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ABSTRACT

The study assessed the use of Blissymbols in the spoken and signed language development of 10 school-aged (mean age 11.5 years) children with developmental dysphasia of whom four also were mildly retarded. The students' expressive abilities in signed and spoken words were initially assessed before the Bliss teaching began, and then again after 1 and 2 years. The total number of expressed symbols in all three communication systems showed a positive trend over the study period. The most statistically significant change was in spoken expression of adjectives in favor of communication by Blissymbols. It was also found that certain concepts which originally had been spoken or signed were later expressed only in sign or by using Blissymbols. Results are discussed in terms of implications for research, teaching, and communicative interactions. Includes 32 references. (DB)

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# REAL-LIFE RESULTS? - MULTISYSTEM SUPPORT FOR DYSPHASIC CHILDREN

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## Abstract

The aim of this study was to assess the function of Blissymbols to spoken and signed language in school-aged children with developmental dysphasia. The students' expressive abilities in signed and spoken words were assessed before Bliss teaching commenced, and one and two years later their expressions using all three systems was measured. The mean-age of the ten children was 11.5 years and six of them had IQ of normal level, four children were mildly retarded. When commencing the Bliss teaching their mean of communication was single words and 2-3 word- and sign sentences.

The total number of expressed symbols in all three communication systems showed positive tendency over the period of the study, but there was also a tendency to change some concepts expressed earlier by spoken or signed communication to only signed and/or Bliss expressions. The most statistically significant change was in spoken expression of adjectives in favour of communication by Blissymbols. The use of Blissymbols appears to be more alternative to difficulties in expression by other modes than facilitative, but the specific nature of the concepts involved and their representative symbols leave open the question the generalisability of the results.

The results of the study are discussed also in relationship to reseach, teaching and interaction. In the


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opinion of authors, their clear priority should be to maximize the benifits for subjects, as distinct from seeking merely measurable results.

# REAL-LIFE RESULTS? - MULTISYSTEM SUPPORT FOR DYSPHASIC CHILDREN

The assessment-intervention programs of augmentative and alternative communication systems for nonspeaking individuals have raised many questions about the paths between research, teaching and pragmatics. Light (1989) defined the concept of communicative as the quality or state of being functionally adequate in daily communication, or having sufficient knowledge and skill to communicate. This is the ideal goal of all work in the field of augmentative and alternative communication. Research in augmentative communication is undertaken in the hope that the results will benefit augmentative communicators, in the short or long term. Practical considerations may, however, too easily be overlooked by researchers, who have understandably different priorities from teachers and therapists. Does teaching increase the true ability of the skills of communication of dysphasic children in the group. Might the time of the teacher have been more effectively spent with teaching the whole class, working with carers or families, dealing with the whole environment, than teaching a child individually a short time per week? How could a bridge be

built between research, teaching and real-life communication?

Sign language is often used as a means of communication for dysphasic children. Use of graphic system with dysphasic-dyspraxic children has been less often described and the relationship of Blissymbols to the learning and use of expressions of signed and spoken language has been still less investigated. Dysphasic children have a specific language disorder with severe learning difficulties. These children, despite primarily normal cognitive capacity, normal hearing, and nearly normal level of receptive language development, are not able to use spoken language to express themselves (Ingram, 1976, Martin, 1986). Owing to deficits in motor programming, such children also have difficulties in using sign language or even gestures. Individuals with speech dyspraxia often have motor sequencing problems in movements of their hands, and these problems are similar to the motor planning problems seen in the speech mechanism (Yorkston & Dowden, 1984, Haynes, 1985).

The purpose of the study was to assess the augmentative function of Blissymbols to spoken and signed language in school-aged children with developmental dysphasia.

Subjects and methods

Blissymbols were taught to ten children, seven girls and three boys, attending classes for children with developmental dysphasia. The mean age of these children at the beginning of the study was 11.5 years (age range 8 years 8 months to 15 years 6 months). In their early rehabilitation before attending special school the children had received communication therapy including the teaching of manual of signs. The intelligence level of six children was nearly normal or above normal and four children were assessed as mildly retarded. When attending school only three children spoke more than ten words and two used only vocalisations and idiosyncratic words. Only two children used 2-3-word sentence expressions. Four children used above three-sign sentences, but all children used single signs and four children had from one- to three-sign expressions. When commencing Bliss teaching the children were at class level from one to eight. Three children had expressive spoken vocabulary of above 60 words and one used above three-word sentences, but all could use above ten single words. All the children except one could use 2-3-sign expressions. At school the children did not receive special

teaching of sign language, but signs were used in their daily communication.

A series of pictures (Niskanen 1971) was used in Bliss teaching. These pictures included the concepts used in teaching of mother tongue in the classes for dysphasics. The intruction of the concepts was structured to develop the children's ability to perceive their meaning, to teach them to speak and/or sign as well as to write them. The series of pictures was divided into twelve themes used in the lessons of the mother tongue. The concepts of these themes were used in individual teaching of Blissymbols. The time for individual Bliss teaching was twenty minutes a week for each child. Speech, signs and Blissymbols were all used at school in lessons and for normal daily communication.

The series of pictures of the twelve themes including different numbers of pictures of single concepts were used in random order to test the ability of the child to express the concept by speech, signing or Bliss (recorded expressed (+) and nonexpressed (-). The ability to express spoken and signed concepts was assessed at the baseline before the teaching of Blissymbols commenced. Measurement of the use of symbols in all three communication systems was carried out twice, at the one-year (I) and two-year (II) periods during the follow-up. The frequencies of expressed and nonexpressed

nouns, verbs, and adjectives were calculated for 1620 observations; 162 items for each of the ten subjects in all three measurements and communication systems (Table 1), and these frequencies were described by percentage of nonexpressed and expressed concepts respectively, for each of nouns (110 items), verbs (31 items) and adjectives (20 items) (Table 2). Thus it is possible to observe the three modes of communication systems in their expressed concepts. The subjects themselves or their abilities to express the items are not compared to each other or to peers. The statistical significances between b·-eline and one-year period and one-year and two-year per.. ι are described by critical values (Critical Ratio, CR) (Cohen & Holliday, 1979, 117).

The analyses follows a single case experimental design (Barlow & Hersen, 1984), A-B design. Baseline observations are speech and sign systems of communication (the control variable), and repeated measurements (I-III) are taken throughout the follow-up period. In the beginning of treatment phase the Bliss teaching (the treatment variable) is introduced, and the speech and sign systems of communication are the dependent variables.

## Results

The percentage frequencies of the total number of each in all three communication systems are referred for expressed concepts (Table 3). At the baseline the percentage frequence of signing was higher compared to that of speech. The frequencies of concepts conveyed have a significant increase between baseline and one-year period in speech (CR=7.307, $p<.001$) and signs (CR=4.639, $p<.001$), and between one-year and two-year periods in signs (CR=2.046, $p<.05$) and Bliss (CR=2.439, $p<.05$). For speech communication from one-year period to two-year period did the Critical Ratio remain nonsignificant.

In spoken communication the increase of the frequencies in nouns from the baseline to one-year period was highly significant (CR=6.690, $p<.001$), in verbs almost significant (CR=2.022, $p<.0.5$), and in adjectives significant (CR=2.592, $p<.02$) (Figure 1). The changes were not significant between one-year and two-year periods. In sign communication the highly significant increase was seen in the frequencies of nouns (CR=3.816, $p<.001$) from the baseline to one-year period, but no significant changes between one-year and two-year periods (Figure 2). In Bliss communication the increase

of frequencies was almost significant in adjectives (CR=2.071, $p<.05$) from the one-year to two-year periods (Figure 3).

## Discussion

In our study all three systems of communication, spoken, signed and blissed, showed positive development during the follow-up period in the group of ten dysphasic children. Allthough the small number of subjects does not allow wide generalizations of the results, the number of observations calculated in ten subjects for 162 items of communication in all three communication systems allows observation of the three modes of communication (spoken, signed and blissed) in their expressed concepts. A similar positive trend in sign and speech systems of communication from the baseline (I) to the one-year period (II) can be seen, but in sign and Bliss systems of communication from the one-year to two-year period (III). The purpose of the study was to assess whether Bliss teaching functions to augment or alternate signed and spoken expressions. It seems that certain concepts earlier expressed spoken or signed were later expressed only signed and/or blissed. This is seen especially in spoken adjectives

and verbs which in the Finnish language are without doubt easier to point than to speak or even sign.

In previous studies, signs have been shown to aid increased speech production for those children who have limited speech (Konstantareas, Webster & Oxman, 1979; Konstantareas 1984; von Tetzhner, 1984), and a combined mode of vocal, manual and symbol systems provides great potential for use with nonvocal, hearing-impaired and severely mentally retarded children, as well as for children with developmental language deficits (Clark, Moores & Woodcock, 1975; Culp, 1989; Cregan 1990). Use of Blissymbols as facilitator of speech and communication for children has been also proved (Kates & McNaughton 1975; Archer 1977; Silverman, McNaughton & Kates 1978). Nonspoken communication affects the use of spoken communication in two ways: (1) by compensating for the inability to use expressions of spoken language, and (2) by facilitating the learning and use of spoken expressions (Silverman, McNaughton & Kates 1978).

The linquistic abilities of the dysphasic children are not reflected by the measured results of on study. However, the change during the follow-up period demonstrates that children with severe language deficits and motor sequencing difficulties have acquired a potential means of expressing themselves by all three modes of communication. The results

show that dysphasic children can learn and use Blissymbols. In this context the use of Blissymbols seems to augment signing and speech, but rather to function as an alternative to difficulties in expression by other modes than to facilitate them.

## Questions arising from the study results

An immediate guery arose from the results, of whether in fact they describe the true ability of the skills of communication in this group of children. Nor was consideration given to the (unwitting) aims of the teacher and the messages given to the children - perhaps unintentionally - about which system was they "should" be using. Such unspoken messages might strongly influence the child's choise of communicative system.

Arising from the above, further relevant questions were: Are crucial variables sometimes overlooked when planning research studies because they are difficult? Is the study set up so that it will be a maximum benefit to the subjects? Might the time of the teacher have been more effectively spent with teaching the whole class, carers, families etc.?

1. Research

As a general principle, should researchers - for ethical reasons - be aiming primarily to solve real-life problems by what they do, or to fulfil real-life needs, rather than primarely concerning themselves with more theoretical questions whose answers can be conveniently analysed statiscally? In research the most limited question is addressed most freguently leaving unanswered the many queries which remain. At best the suggestions for practice come after the series of studies and explore several aspects of a particular problem (Reid 1989).

The results of this study could also be observed in the light of action research. The children have received Bliss teaching using the method described. The authors and teachers as well as the subjects, however, have seemed to draw closer to communicating with the three modes. The subjects have also achieved through their three communication systems. The basis of action research is to see the effect of teaching itself as a part of a functioning educational system and of the student's natural maturation (Cohen & Manion, 1984). The results of the two-year Bliss teaching period between communication systems was observed in time series and analysed in A-B design. The design has

its weaknesses because it does not take account of the effects of time and maturational factors (Barlow & Hersen 1984). Cambell and Stanley (1966) have referred to this strategy as a "quasi-experimental design". The strategy does not permit a full experimental analysis of the controlling effects of the treatment; the changes in the treatment phase may have resulted as a function of correlation with some fortuitous and uncontrolled event (Barlow & Hersen 1984).

But by and large, research in the field of AAC is undertaken in the hope that results will benefit augmentative communicators in the short or long term, while the communication in everyday situations and testing are separated from each other. The authors believe that therapeutic and communication programs should be flexible and cover the wide variety of communicative situations, while research may try to limit the concepts and intervening factors to allow strict empirical testing in contextually controlled environment (Leiwo 1990).

2. Teaching

The educational goal of all teaching is to develop not only the scholastic skills of the children but to support the child's natural maturation and his/her skills and abilities in all daily living. The teachers's role is that of the mediator and facilitator of learning, interacting with the students in ways that are most conducive to their growing understanding and planning of their own learning programs. The environment provides the context and the stimulus for learning (McNaughton, 1986).

The individual teaching time in the study was only 20 minutes/week. One should ask if this is time enough to teach or learn a language system for students who have specific learning difficulties. The ability of the children to perceive Blissymbols justifies the format of the study. However, more teaching time would increase the possibility of individualizing the methods and experiences for students of the system.

Another question is the difference between individual teaching and group teaching. All modes of communication were used at school lessons during the study period. The symbols should be an extra classroom tool facilitating a greater variety of teaching approaches (Cregan 1989; Cregan & Lloyd

1990). The series of pictures used in individual Bliss teaching were used in the normal teaching of the mother tongue. Perhaps this was a point of observation for vocabulary selection generalized from the teaching situation to daily communication. Group work with multimodal input of symbols (graphics, signs and speech) at its best is a potential for all to communicate with each other, irrespective of their choice of expressive mode.

The results of research even when it is methodologically sound are very often not the direct answer to the questions of every-day life or even teaching or therapy situations. Canale (1983) has argued against evaluation based on students' performance in nonfunctional contexts such as classroom tests, and has proposed instead that communication should be judged as successful or not on the basis of actual outcomes in real life situations. But it is also observed that the children produce a wider range of communicative functions in the eliciting contexts with the clinician than in the free play interaction with their caregivers (Light, Collier & Parners, 1985; Jaroma, 1985). Although the results of this study are based on the traditional investigation, methods of evaluation, all three communication systems were used at school and residential setting.

3. Interaction

What about the interaction with AAC user's daily environment, partners of daily communication, peers, staff members, family members? The symbols were used in daily communication at school and in the residential setting. The group setting is an opportunity to learn from peers; it is a vehicle also for shared social learning as well as an enjoyable interactive group activity. It is recognized that many modes of communication can be effective depending on the situation (Hooper, Connell & Flett 1987). It is frequently observed that persons who use paravocal means of communication often choose to use less efficient of effective method than their communication aid. In real life the children use the system which they find easiest for a given situation, and this is not always an aided system.

The data found by the researchers provides information on some functioning of the subjects, but the knowledge has to be discussed and interpreted in a way that gives the child maximal benefit (Calculator, 1988). Any intervention program should ensure that clients learn to integrate the skills they acquire and learn to use these skills functionally to communicate effectively within the demands of the daily environment (Light, 1989). Training communication partners of augmentative communication users is an integral part of

creating an effective communication system for the nonspeaking individual. Indeed training the partners is the key to success (Light, 1988). Even more important is to modify the environment so that nonspeaking people can take part in all activities of daily living. Skills of interaction can be trained in courses for caregivers (Allen, 1988) and for parents (Alltheide, 1986, Berry 1987). Training courses for parents and key workers of children could greatly enhance the child's success in using communication aids effectively. The training courses should involve the teaching of specific interaction skills, including turn-taking, promoting initiation, and extending the use of other functional language skills by the child. (Woodfin & Larson, 1988). In the present study, promoting the use of Blissymbol system in situations of everyday life has integrated the Blissymbols as an effective means of communication. Thus the result may show a real change in choice of communication mode.

REFERENCES

Allen, J. M. (1988). Teaching interaction skills to caregivers of aided communicators. Augmentative and Alternative Communication, 4(3), 167-168.

Altheide, M. R. (1986). Introducing augmentative communication: a model for parent education. Augmentative and Alternative Communication, 2(3), 70.

Archer, L. A. (1977). Blissymbolics - A non-vocal communication system. Journal of Speech and Hearing Disorders, 42, 568-579.

Barlow, D. H., & Hersen, M. (1984). Single case experimental designs. Strategies for studying behavior change. New York: Pergamon Press.

Calculator, S. (1989). Promoting the aquisition and generalizarion of conversational skills by individuals with severe disabilities. Augmentative and Alternative Communication, 4, 94-103.

Campbell, D. T., Stanley J. C. (1966). Experimental and quasi-experimental designs for research. In D.T.Cambell & J.C. Stanley. Handbook of Research on Teaching. Chicago: Rand McNally.

Canale, M. (1983). From communicative competence to communicative lannguage pedagogy. In Richards J., & Schmidt R. (Eds.) Language and communication. New York: Longman Press.

Clark, C., Moores, D., & Woodcock, R. (1975). Minnesota early language development sequence: Teacher's Manual. Development Kit. Minneapolis, University of Minnesota Research, Development and Demonstration Center in Education of handicapped children.

Cohen, L. & Holliday, M. (1979). Statistics for education and physical education. London: Harper & Row Ltd.

Cohen. L., & Manion, L. (1984). Research methods in education. Croom Helm, London. 1974-190.

Cregan, A., (1989. Sigsymbol Handbook. The End House, 76, Wood Close, Hatfield, Herts, AL10 8TX, England.

Cregan, A., (1990). Sigsymbols and manual signs: keeping open options for expression. Augmentative and Alternative Communication, 6(2).

Cregan, A. & Lloyd, L. L. (1990). Sigsymbols. Don Johnston Develomental Eqm. Inc, Wauconda, Illinois.

Haynes, S. (1985). Developmental apraxia of speech: Symptoms and treatment. In D. F. Johns (Ed.), Clinical Management of Neurogenic Communicative Disorders (2nd ed.). (pp. 259-266). Boston: Little Brown Co.

Hooper, J., Connell, T. M. & Flett, P. J. (1987). Blissymbols and manual signs. Augmentative and Alternative Communication, 3(2), 68-76.

Ingram, T. (1976). Speech disorders in childhood. In Lenneberg E. H. (Ed.) Foundations of Language Development. London: Academic Press.

Jaroma, M. (1985). Blisskommunikation för dysfatiska skolbarn vid Jyväskylä skola för hörselskadade. 17. nordiske kongres om specialundervisning. Rapport, Köpenhavn, 73-91.

Kates, B., & McNaughton, S. (1975). The first application of blissymbolics as a communication medium for non-speaking children: History and development, 1971-1974, Toronto, Ont.: Blissymbolics Communication Institute.

Konstantareas, M. M., Webster, C. P., & Oxman, J. (1979). Manual language acquisition and its influence on other areas of functioning in autistic and autistic-like children. Journal of Psychology and Psychiatry, 20, 337-350.

Konstantareas, M. M. (1984). Sign Language as a Communication Prosthesis with Language-Impaired Children. Journal of Autism and Developmental Disorders, 14, 9-25.

Light, J. (1988). Interaction involving individuals using augmentative and alternative communication systems: state

of art and future directions. Augmentative and Alternative Communication, 4(2), 66-81.

Light, J. (1989). Toward a definition of communicative competence for individuals using augmentative and alternative communication systems. Augmentative and Alternative Communication, 5(2), 137-144.

Martin, L.J. (1986). Assessing current theories of cerebral organization. In Ceci S. (Ed.), Cognitive, social, and neuro psychological aspects of learning disabilities, I. London: Lawrence Erlbaum Ass.

McNaughton, S. (1985). Ed. Communicating with Blissymbolics. Toronto, Ontario: Blissymbolics Communication Institute.

McNaughton, S. (1986). An educational model relating to the graphic symbol system within augmentative communication. Augmentative and Alternative Communication, 2(3), 101-102.

Niskanen, M. (1971). Luen, puhun, kirjoitan. Tampere: Gummerus.

Reid, B. (1989). Promoting spontaneous communication. Communicating together. 7(3), 9-10.

Silverman, H., Naughton, S., & Kates, B. (1978). Handbook of Blissymbolics, Toronto, Ontario: Blissymbolics Communication Institute.

Woodfin, S.T., & Larson, J. (1988). Training staff members as effective partners of AAC users. Augmentative and Alternative Communication. 4(3), 165.

von Tetzchner, S. (1984). Facilitation of early development in a dysphasic child by use of signed Norwegian. Scandinavian Journal of Psychology, 25(3), 265-275.

Yorkston, K.M. & Dowden, P.A. (1984). Nonspeech language and communication systems. In Holland A. (Ed.), Language disorders in adults. San Diego: College-Hill Press, 283-312.

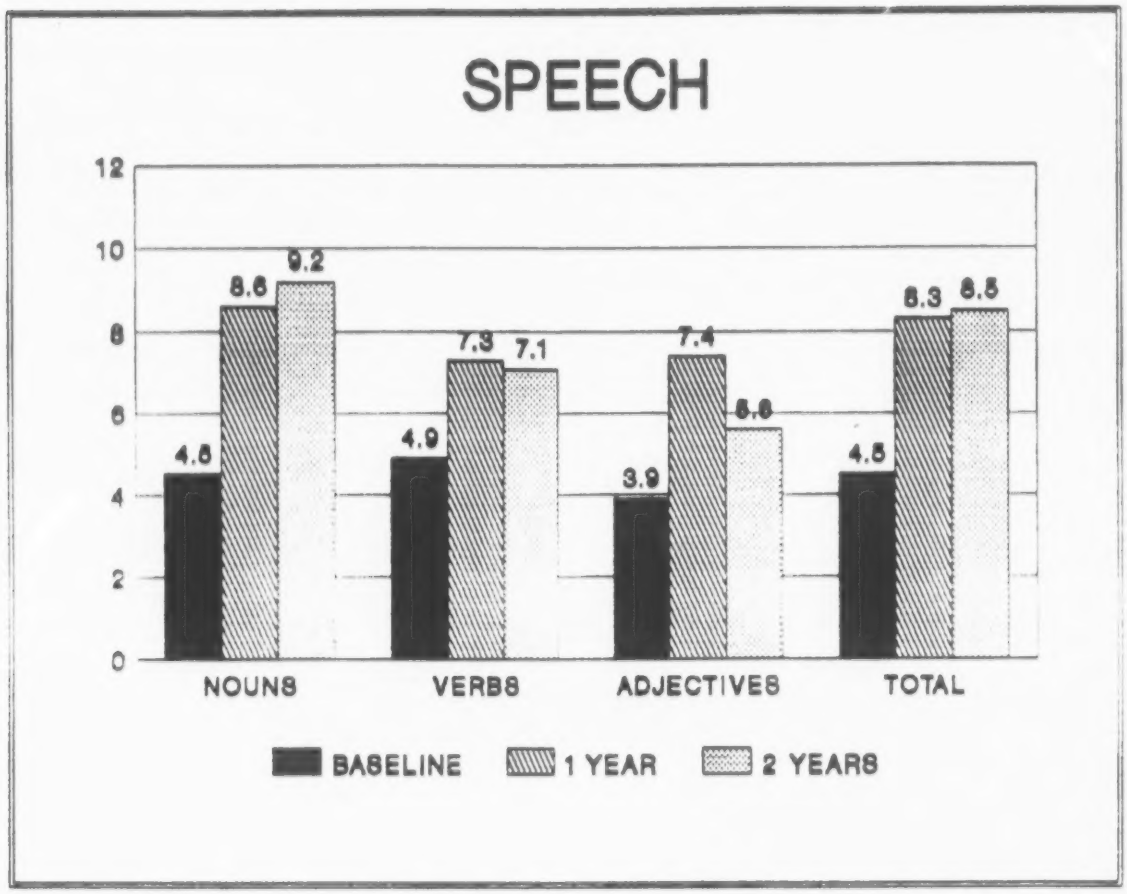
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Figure 1

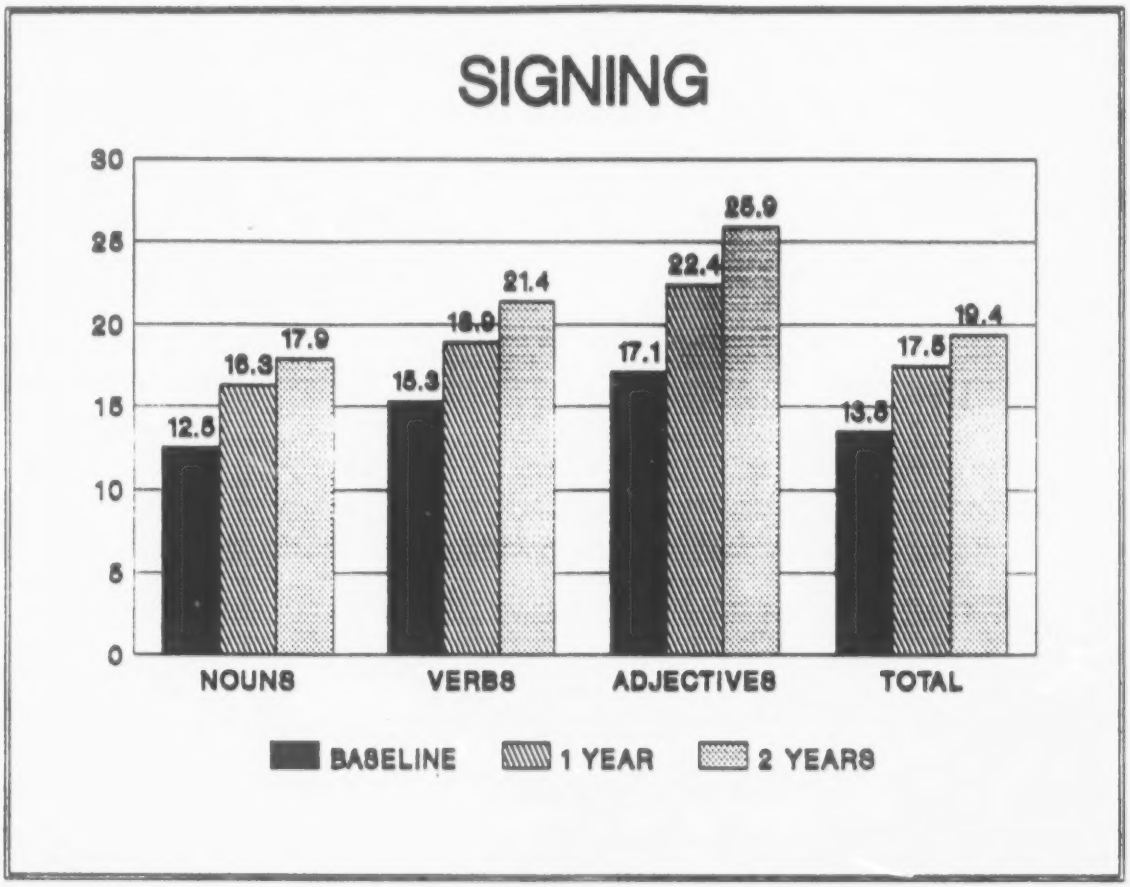
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Figure 2

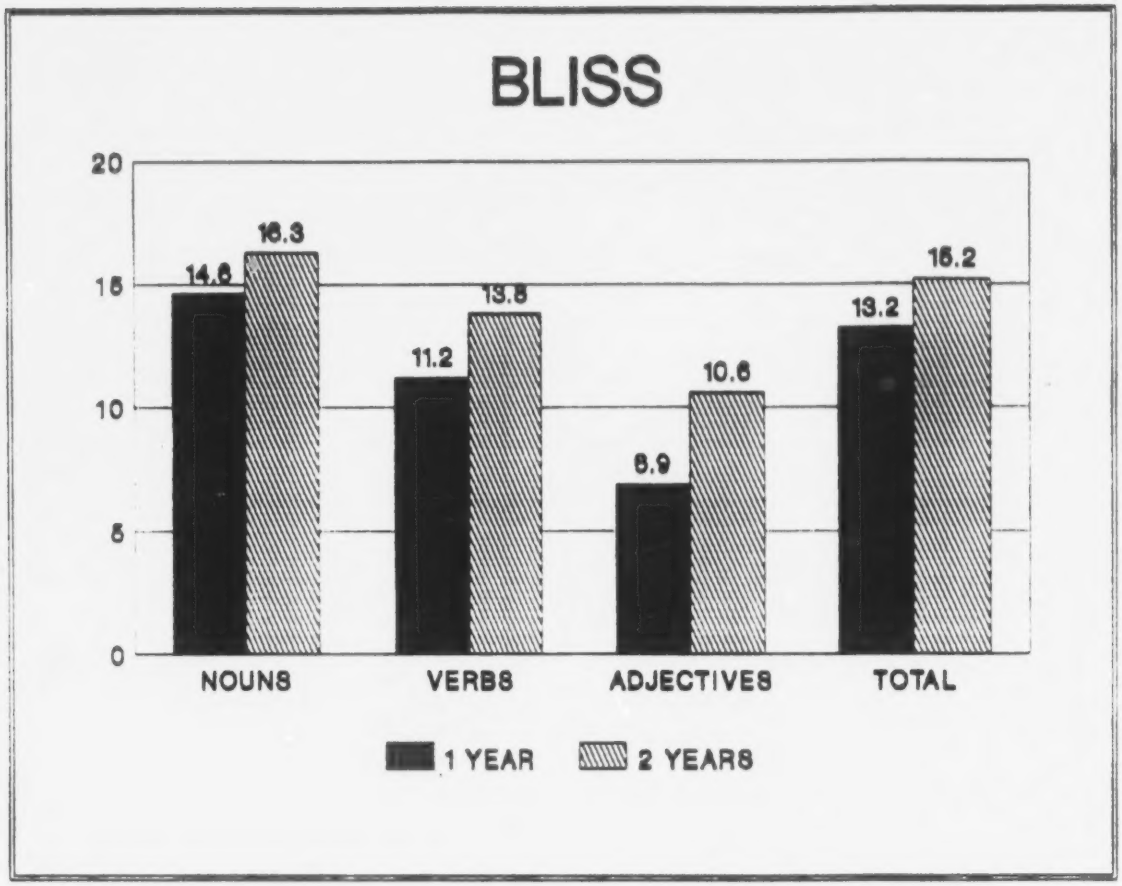
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Figure 3

Legends for figures

Figure 1. Percentage frequencies of concepts conveyed in spoken communication in the word categories of nouns, verbs and adjectives at baseline, one-year and two-year periods.

Figure 2. Percentage frequencies of concepts conveyed in sign communication in the word categories of nouns, verbs and adjectives at the baseline, one-year and two-year periods.

Figure 3. Percentage frequencies of concepts conveyed in Bliss communication of the word categories of nouns, verbs and adjectives at the one-year and two-year periods.

Table 1. Frequencies of expressed and nonexpressed nouns, verbs and adjectives in each of three communication systems (speech, signing, and Bliss) at baseline, one-year and two-year periods during the follow-up.

| | | BASELINE | | ONE-YEAR | | | TWO-YEARS | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SP | SI | BL | SP | SI | BL | SP | SI |
| Nouns | 1 | 714 | 402 | 290 | 741 | 475 | 227 | 751 | 416 |
| | 2 | 174 | 486 | 568 | 335 | 635 | 633 | 358 | 694 |
| Verbs | 1 | 193 | 83 | 115 | 218 | 102 | 94 | 229 | 74 |
| | 2 | 51 | 160 | 118 | 77 | 198 | 145 | 75 | 225 |
| Adjectives | 1 | 138 | 63 | 131 | 158 | 73 | 107 | 168 | 53 |
| | 2 | 22 | 97 | 39 | 42 | 127 | 60 | 32 | 147 |
| Total | 1 | 1045 | 548 | 536 | 1117 | 650 | 428 | 1148 | 543 |
| | 2 | 247 | 743 | 725 | 454 | 960 | 838 | 465 | 1066 |

BL = Bliss, SP = speech, SI = Sign

1 = nonexpressed, 2 = expressed

1620 observations (162 items of ten subjects)

nouns: 110 observation (111 items of ten subjects)

verbs: 310 observations (31 items of ten subjects)

adjectives: 200 observations (20 items of ten subjects)

Table 2. Percentage frequencies of expressed and non-expressed concepts in each of three communication systems (speech, signing and Bliss) at baseline, one-year and two-year periods.

| % | | BASELINE | | ONE-YEAR PERIOD | | | TWO-YEAR PERIOD | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SP | SI | BL | SP | SI | BL | SP | SI |
| Nouns | 1 | 17.77 | 10.00 | 7.22 | 18.44 | 11.82 | 5.65 | 18.69 | 10.35 |
| | 2 | 4.48 | 12.51 | 14.62 | 8.62 | 16.30 | 16.30 | 9.22 | 17.87 |
| Verbs | 1 | 17.41 | 7.49 | 10.37 | 19.67 | 9.21 | 8.48 | 20.66 | 6.68 |
| | 2 | 4.86 | 15.25 | 11.24 | 7.34 | 18.87 | 13.82 | 7.15 | 21.44 |
| Adjectives | 1 | 15.48 | 7.07 | 14.70 | 17.73 | 8.19 | 12.00 | 18.85 | 5.94 |
| | 2 | 3.87 | 17.13 | 6.89 | 7.42 | 22.43 | 10.60 | 5.65 | 25.97 |
| Total | 1 | 17.37 | 9.11 | 8.91 | 18.57 | 11.09 | 7.11 | 19.08 | 9.03 |
| | 2 | 4.49 | 13.51 | 13.18 | 8.26 | 17.45 | 15.23 | 8.46 | 19.38 |

BL = Bliss, SP = speech, SI = Sign

1 = nonexpressed, 2 = expressed

1620 observations (162 items of ten subjects)

nouns: 110 observation (111 items of ten subjects)

verbs: 310 observations (31 items of ten subjects)

adjectives: 200 observations (20 items of ten subjects)

Table 3. Percentage frequencies of total number of items in the three communication systems at the baseline, one-year and two-year periods, and Critical Ratios from the baseline to one-year period (I-II) and between the one-year and two-year periods (II-III).

| | | | % | | | CR | CR |
|---|---|---|---|---|---|---|---|
| | | | Baseline | one-year | two-years | | |
| Dependent variables: | | | | | | | |
| | speech | 1 | 17.37 | 18.57 | 19.08 | 1.274 | 0.527 |
| | | 2 | 4.49 | 8.25 | 8.45 | 7.307*** | 0.292 |
| | sign | 1 | 9.10 | 11.09 | 9.02 | 2.784** | -2.653** |
| | | 2 | 13.51 | 17.45 | 19.38 | 4.639*** | 2.046 |
| Treatment variable: | | | | | | | |
| | Bliss | 1 | | 8.90 | 7.11 | | -2.530* |
| | | 2 | | 13.18 | 15.23 | | 2.439* |

1 = nonexpressed, 2 = expressed

*p<.05;**p<.01;***p<.001

1620 observations total (162 items of ten subjects)

## Acknowledgements

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